REMARKS

Claims 1-3 are pending in this application. Claims 4-14 have been canceled without prejudice or disclaimer and claim 1 has been amended herein.

Restriction is required to either Group I, claims 1-3, or Group II, claims 4-14 (Office action points 1-6).

Applicants confirm the election of Group I (claims 1-3), and have canceled claims 4-14 without prejudice or disclaimer.

Claims 1-3 are rejected under 35 U.S.C. 112, first paragraph, as being incomplete for omitting essential steps (Office action point 8).

The rejection is overcome by the amendment to claim 1.

The Examiner refers specifically to "applying a wet-cleaning treatment to the wafer" as being omitted, presumably referring to the "wet-cleaning" recited in the preamble.

The phrase "wet-cleaning wafers" refers to wafers that have already been immersed in cleaning baths, as described on page 1, second paragraph, of the specification. This is stated explicitly on page 6, last paragraph, where it states that "the wafer is cleaned by the introduction of various chemical fluids in the sealed cleaning housing in a predetermined order, and finally dried through a spin drying treatment ..." This is also apparent from the description of the apparatus of the invention and its use. In particular, page 12, second paragraph, describes supply of chemical fluids to the face of the wafer and pages 13-15 describe subsequent spin-drying.

In the amendment, the phrase "wet-cleaning wafers" has been amended for clarity to -- wet-cleaned wafers --. The participle "cleaned" is grammatically more proper than the gerund "cleaning". The amendment therefore clarifies that the wafers recited in the claim are already "wet-cleaned".

The method as recited in claim 1 therefore does not omit any steps.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Bergman et al. (U.S. Patent No. 5,377,708) (Office action point 10).

The rejection of claims 1-3 over Bergman et al. is respectfully traversed.

The Examiner refers in particular to Bergman's column 8, lines 19-22, which describe a spin dry process for a semiconductor wafer for drying the wafer after vapor phase chemical processing (column 8, lines 7-8). The Examiner states that the limitation of claim 1 regarding the amount of inert gas being supplied at the outer peripheral portion being larger than that at the center is achieved in Bergman et al., with citation to "see entire reference of Bergman et al., for instance, Figure 1, col. 8, lines 19-22)". However, Applicants respectfully submit that the Examiner has not clearly indicated the particular part of Bergman that teaches this limitation, as required under 37 CFR 1.104 (c)(2).

Applicants respectfully disagree that Bergman et al. meets this limitation. Applicants note that Bergman's Figure 1 illustrates "a preferred configuration for vapor processing wafers according to the invention", as described in column 8, line 30, to column 10, line 10. The only mention of spin-drying in these lines would appear to be in column 10, lines 5-7, stating: "The post-treatment spin can be performed while also passing a flow of drying gas through the chamber using inlet port

76." Inlet port (drying gas introduction port) 76 is described only briefly in column 9, lines 19-26, as follows:

> "FIG. 1 also shows that the processing chamber 16 is further fitted with a drying gas introduction port 76 which receives nitrogen or other drying gas from drying gas supply line 77. The drying gas can be input into the processing chamber via a plurality of circumferentially spaced ports which are at approximately the same elevation as the wafer or slightly below and oriented to **direct the flow of drying gas across the processed wafer surface**." (emphasis added).

To demonstrate that Bergman et al. does not teach the limitations of claim 1, Applicants compare Bergman's apparatus to the apparatus of the present invention, in which the inert gas is introduced in gas injection section 30, of the particular design described on page 14 of the specification. It is this apparatus that achieves the limitation of claim 1 of the amount of inert gas being supplied at the outer peripheral portion being larger than that at the center.

In particular, there is no analogue in Bergman for the injection openings, by which this limitation is achieved in the method of claims 1-3. Bergman's apparatus, in which the gas is simply directed across the processed wafer surface, would not meet the limitation of claim 1.

Applicants therefore respectfully submit that claims 1-3 are not anticipated by Bergman et al.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Cady (U.S. Patent No. 4,544,446) (Office action point 11).

The rejection of claims 1-3 is respectfully traversed.

The Examiner refers to Figures 1-2 of Cady and column 3, lines 38-49, and column 4, lines

48-56. Column 3, lines 38-49, discuss background art and indicate that spin drying is used to dry wafers. In particular "a flow of nitrogen directed at the center of the wafer is needed to move the droplets" on a hydrophobic surface. Column 4, lines 48-56, disclose a drying step including "replacing the working fluid with an inert gas ... so that the fluid flow rinse is replaced by an inert gas stream." These lines of the reference do not refer specifically to Figures 1 and 2.

Figures 1 and 2 of Cady are an "illustration of the subject chemical reactor illustrating a centrally fed fluid flow guide maintained at a predetermined gap above a wafer to be processed, also illustrating a feedback path for the control of the fluid through the reactor" (column 6, lines 3-7).

The Examiner also refers to column 7, lines 44-58, which indicate that "the fluid flow is indicated by arrows 40 so that the fluid, be it liquid or gas, moves outwardly via centrifugal force an then downwardly as indicated into a chamber 42 ...." This can be seen in Figure 1 of the reference, in which the fluid or gas appears to be directed perpendicularly to the center of the wafer and then to flow outwardly along the wafer surface. The downward motion of the fluid occurs only after it has passed the edge of the wafer. The Examiner also refers to Figures 6-8B, which illustrate various configurations of the fluid flow guide 12.

In traversing the rejection, Applicants submit that they can find no teaching in Cady that Cady's apparatus can achieve the limitation of claim 1 of the amount of inert gas being supplied at the outer peripheral portion being larger than that at the center. Rather, based on Applicants' understanding of Cady, this limitation would not be met.

Applicants note that in Cady, the same gas flows over the entire surface. In fact, it would appear that since the gas is required to leave at the outer edge of Cady's wafer, and since area

increases toward the periphery of a disc, that the outer edges of Cady's wafer inherently get a smaller flow of gas per unit area than the inner portions.

Moreover, Cady's apparatus is clearly inconsistent with the recitation of present claim 2, which recites a sealed drying space at the outer peripheral portion of the face of the wafer. Cady's apparatus lets the gas leave at the outer peripheral portion.

Applicants therefore respectfully submit that claims 1-3 are not anticipated by Cady.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version with markings to show changes made

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claim 1 as follows:

1. (Amended) A single wafer type substrate cleaning method of ~~wet-cleaning~~ wet-cleaned wafers which are not stored in a cassette, individually, in a sealed cleaning housing, said method consisting of the application of a spin drying treatment to the face of each wafer by supporting and rotating each wafer at high speed in the sealed cleaning housing while an inert gas for preventing oxidation is supplied to the face of the wafer in a drying step, where the amount of inert gas to be supplied to the face of each wafer is such that the amount of inert gas supplied at the outer peripheral portion is larger than that at the center thereof.